

such an inquiry. I have attempted the observation with this instrument, it is true, but I need scarcely add, unsuccessfully.

*Durham Observatory,*  
*Feb. 22, 1873.*

P.S.—In the *Memoirs of the Royal Astronomical Society*, vol. xxviii. pp. 117, *et seq.* there are recorded no less than six cases of projection seen by Captain Jacob at the Madras Observatory in the short space of sixteen months, all of which I have steadily ignored. They are all noted as distinct cases of projection, but no estimate of the duration or the distance from the limb is given. Respecting two of them, however, a note may be found in the *Monthly Notices*, vol. xvii. page 17, written only eight days after the observations were made, in which that meritorious observer expresses himself far more doubtfully, and indeed appears to describe elaborately all the peculiarities of a case of “hanging upon the limb.” This leads me to question, whether Captain Jacob ever saw a star fully projected on the disk, and to reject his observations as doubtful. I am unaware whether the Astronomer Royal, who places these observations in the list of certain projections, had any further evidence to guide him in this matter.

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*Note on Mr. Plummer's Paper on the Apparent Projection of Stars.* By Richard A. Proctor, B.A., Cambridge.

It is commonly assumed that if the Moon's figure be such as Hansen supposes (though it must be remembered that Newcomb disputes Hansen's conclusion), the atmosphere would be on the further hemisphere of the Moon, and disposed symmetrically around the point antipodal to the centre of the visible disk at the time of mean libration. But I conceive that a very different arrangement would take place,—the densest part of the lunar atmosphere lying round the parts of the Moon which form the outline of her disk at the time of mean libration. Let us assume, with Hansen, that the Moon's surface is formed of two spherical surfaces, the part nearest to us having the least radius, so that in fact the Moon is shaped like a sphere to which a meniscus is added, said meniscus lying on the visible hemisphere. If we imagine the meniscus removed, the lunar atmosphere would dispose itself symmetrically round the Moon's spherical surface. Now, suppose that while this state of things exists, the lunar air within the region now occupied by the meniscus of solid matter is suddenly changed to matter of the Moon's mean density, what could be the effect of this change, by which new matter would

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be added on the side of the Moon towards the Earth? Surely not that the remaining atmosphere would tend to the further side of the Moon, but, on the contrary, that it would be attracted towards the nearer side by the new matter there added. The lunar air would be shallower on this nearer side, no doubt, because the air thus drawn to it would not make up for the air supposed to be changed into the solid form; but at the parts which form the edge of the disk there would be an access of air, without this diminishing cause, and the air would therefore be denser there than elsewhere. But in this final state of things there would be equilibrium; we learn then what are the conditions of equilibrium for a lunar atmosphere, assuming the Moon's globe to have the figure supposed by Hansen. There would be a shallow region in the middle of the visible disk, and a region slightly shallow directly opposite, while the mid-zone would have the deepest atmosphere. But it is around this zone precisely that no signs of a lunar atmosphere have as yet been recognised.

I may remark that this reasoning may be extended to the Earth. Assuming the waters of the Earth drawn towards the South Pole because of a displacement in the Earth's centre of gravity, we may regard the surface of the sea in the southern hemisphere as standing above the mean surface of the globe, and a part of the southern seas as therefore constituting a meniscus like that conceived by Hansen to exist in the case of the Moon. It would follow, then, if my reasoning be correct, that we should have the atmosphere shallowest in light southern latitudes—shallow, but only slightly so, in high northern latitudes, and densest between the tropics; but this, as is well known, is precisely the observed arrangement.\*

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\* The shallowness of the air in high Southern latitudes was one of the most remarkable phenomena discovered during Ross's Antarctic voyages; and at the risk of having Antarctic voyaging regarded as being with me like King Charles's head in Mr. Dick's memorial, I venture to note that it would be most desirable to obtain more information as to this remarkable feature of the atmosphere.